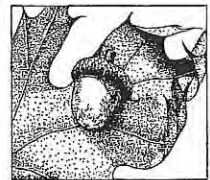




FOREST MANAGEMENT PLAN

Submitted to: Massachusetts Department of Conservation and Recreation
For enrollment in CH61/61A/61B and/or Forest Stewardship Program



CHECK-OFFS

CH61	CH61A	CH61B	STWSHP	C-S
cert. <input type="checkbox"/>	cert. <input type="checkbox"/>	cert. <input type="checkbox"/>	new <input checked="" type="checkbox"/>	EEA <input checked="" type="checkbox"/>
recert. <input type="checkbox"/>	recert. <input type="checkbox"/>	recert. <input type="checkbox"/>	renew <input type="checkbox"/>	Other <input type="checkbox"/>
amend <input type="checkbox"/>	amend <input type="checkbox"/>	amend <input type="checkbox"/>	Green Cert <input checked="" type="checkbox"/>	
Plan Change: _____ to _____			Conservation Rest. <input type="checkbox"/>	
			CR Holder _____	

Administrative Box

Case No.	<u>331.9730</u>	Orig. Case No.	<u>- new</u>
Owner ID	<u>503169</u>	Add. Case No.	
Date Rec'd	<u>5.2.13</u>	Ecoregion	<u>221Ae</u>
Plan Period	<u>2014-2023</u>	Topo Name	<u>***</u>
Rare Spp. Hab.	<u>yes</u>	River Basin	<u>Mill</u>

OWNER, PROPERTY, and PREPARER INFORMATION

Property Owner(s) The City of Northampton, Department of Public Works,* **"KINGSLEY LOT"**
Mailing Address 125 Locust Street, Northampton, MA, 01060 Phone (413) 587-1376

Property Location: Town(s) WESTHAMPTON Road(s) North Road

Plan Preparer Michael Mauri, Forester Mass. Forester License # 161
Mailing Address 20 West Street, South Deerfield, MA 01373 Phone (413) 665-6829

RECORDS

Assessor's Map No.	Lot/Parcel No.	Deed Book	Deed Page	Total Acres	Ch61/61A 61B Excluded Acres	Ch61/61A 61B Certified Acres	Stewshp Excluded Acres	Stewshp Acres
<u>12</u>	<u>29</u>	<u>797</u>	<u>516</u>	<u>96.54</u>	<u>0</u>	<u>96.54</u>	<u>0</u>	<u>96.54</u>
<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
TOTALS				<u>96.54</u>	<u>0</u>	<u>96.54</u>	<u>0</u>	<u>96.54</u>

Excluded Area Description(s) (if additional space needed, continue on separate paper)

None

HISTORY Year acquired 1923 Year management began +/- 1923**

Are boundaries blazed/painted? Yes ☐ No ☒ Partially ☐

What treatments have been prescribed, but not carried out (last 10 years if plan is a recert.)?

stand no. N/A treatment _____ reason _____

(if additional space needed, continue on separate page)

Previous Management Practices (last 10 years)

Stand #	Cutting Plan #	Treatment	Yield	Value	Acres	Date
<u>N/A</u>						

Remarks: (if additional space needed, continue on separate page)

*Attention Nicole Sanford, Senior Environmental Scientist; **softwood plantations were established

*** Chester & Easthampton

Landowner Goals

Please **check** the column that best reflects the importance of the following goals:

Goal	Importance to Me			
	High	Medium	Low	Don't Know
Enhance the Quality/Quantity of Timber Products*	X			
Generate Immediate Income		X		
Generate Long Term Income	X			
Produce Firewood			X	
Defer or Defray Taxes			X	
Promote Biological Diversity	X			
Enhance Habitat for Birds		X		
Enhance Habitat for Small Animals		X		
Enhance Habitat for Large Animals		X		
Improve Access for Walking/Skiing/Recreation			X	
Maintain or Enhance Privacy			X	
Improve Hunting or Fishing			X	
Preserve or Improve Scenic Beauty			X	
Protect Water Quality	X			
Protect Unique/Special/ Cultural Areas	X			
Attain Green Certification	X			
Other:				

*This goal must be checked "HIGH" if you are interested in classifying your land under Chapter 61/61A.

In your own words, describe your goals for the property:

Promote and sustain a diverse, healthy and vigorous forest, and maintain associated infrastructure in good operating condition, so that the primary goal of water quality protection, and secondary goals of long-term timber revenue and habitat diversity are served.

Stewardship Purpose

By enrolling in the Forest Stewardship Program and following a Stewardship Plan, I understand that I will be joining with many other landowners across the state in a program that promotes ecologically responsible resource management through the following actions and values:

1. Managing sustainably for long-term forest health, productivity, diversity, and quality.
2. Conserving or enhancing water quality, wetlands, soil productivity, carbon sequestration, biodiversity, cultural, historical and aesthetic resources.
3. Following a strategy guided by well-founded silvicultural principles to improve timber quality and quantity when wood products are a goal.
4. Setting high standards for foresters, loggers and other operators as practices are implemented; and minimizing negative impacts.
5. Learning how woodlands benefit and affect surrounding communities, and cooperation with neighboring owners to accomplish mutual goals when practical.

Signature(s): Edward S. Huntley

Date: 4/30/13

Owner(s) (print) Edward S. Huntley

(This page will be included with the completed plan.)

Page _____ of _____

Property Overview:
Kingsley Farm Tract
City of Northampton DPW Land
North Road
Westhampton, MA

Landscape/Regional Context

The local pattern of land use is mainly forested or agricultural, with nearby sand and gravel quarrying, grassland and row-crop farming, maple sugaring, and residential development occurring over recent decades. This parcel is within the watershed of the Roberts Meadow Reservoirs, which historically served as a back-up drinking water system for the City of Northampton. Other local uses are forestry/logging, hunting, snowmobiling, hiking and cross-country skiing, as well as off-road vehicle use. This parcel is near other Department of Public Works (DPW) watershed land (Roberts Meadow Reservoirs), other land protected by the City of Northampton (Mineral Hills, Sawmill Hills, and Roberts Hill Conservation Areas) and protected private land (e.g. Marble Brook Conservation Restriction).

Distinguishing or special features include: This large tract of land is located at the flat foot of Hanging Mountain. Although it is not directly contiguous with the City's other large ownerships (mentioned above), these areas are in close proximity. A significant stretch of Roberts Meadow Brook crosses this land. There is a large area of white pine and hardwood forest with an increasing presence of sugar maple, as well as plantations of red pine, Norway spruce and white pine. A former gravel pit area provides a range of wetland conditions to complement the upland habitats.

Property Overview

Listed as 96.54 acres, in Westhampton, MA. The entire acreage is to be enrolled in DCR's Forest Stewardship Program and Green Certification Programs. The parcel boundaries are shown in an unrecorded 1923 survey (on file with DPW). The pins said to be at the southwest, southeast and northeast corners could not be located, and the eastern boundary is difficult to locate. The northern boundary is well defined.

The land was taken from Willie W. Kingsley by the Office of Water Commissioners, City of Northampton, on November 20, 1923.

Topography: most of the acreage is on flat or mildly sloping terrain. The only steep areas are the tall western banks along the upper part of Roberts Meadow Brook and in some of the area along North Road (see Forest stand & Boundary Map). No ledge outcrops were observed. Much of the central part of the land has a high water table.

Dominant forest types are: tall and maturing white pine, red oak, and a hardwood mix that includes sugar maple and white ash, with not much hemlock. There are two plantations: one is tall Norway spruce and white pine, the other is red pine of medium height with an emerging

hardwood mid-story and understory that includes a strong component of sugar maple. There are wetlands including a large, significantly altered gravel bank with shrub swamp, shallow marsh and a beaver pond.

Main tree ages: probably date back to 1900-1940.

Major events shaping this forest: (forest-disturbance history): Like most of the forests of Southern New England, this forest has been shaped by both natural and human factors; these factors are intertwined to such a thorough extent that, in effect, they cannot always be separated.

A specific history of this site would be an undertaking that goes beyond the scope of this plan. The possible uses of this land by Indians (i.e. native, pre-European people), and the uses of this land by these people after the onset of European fur trading and eventual trading-post and agricultural settlement, are not addressed in this plan. Direct European use of this land probably began with land clearing of the original (primary) forest by settlers, for purposes of farming, possibly as early as the 17th century, although locations such as Roberts meadow may have already been cleared by Indians. In general, the tillable soils were cleared of stones as needed and crops were planted while the more rugged or wetter terrain was pastured with cattle and/or sheep, to a greater or lesser degree. While it lasted, farming kept the natural tendency toward reforestation fully or partially at bay. In the mid 1800's much of this area was in pasture (or sometimes, on steep, fertile land, in sugar bushes) but the long process of farm abandonment had begun along with an overall reduction in the widespread intensity of farming use, which allowed the natural re-growth of forest to white pine (sometimes called old-field white pine). Some areas are still in old-field pine today. But other areas of pine regrowth were "cut off", usually by clearcutting, giving rise to oak-hardwood and hemlock forests. Sometimes these oak-hardwood and hemlock forests were cut off, giving rise to a new hardwood forest, often with less oak and hemlock and more birch, especially black birch, as well as red maple. In a few instances, non-native softwoods were planted — by DPW — especially red pine, but also Norway spruce and Scots pine. White pine was also planted. Because all of this has occurred at various times in various places with varying degrees of intensity and consistency, the landscape-level forest is diverse in terms of species composition. However, in terms of structure, the forest is relatively uniform, with tall, closed and sometimes crowded canopies occupying most sites.

Forestry has been practiced since the early days of the watershed. We do not have a detailed history of early forest management, but a 1988 report by Karl Davies, the previous forester for DPW, sheds some light. Softwood plantations were established in the first few decades of the 1900's on old fields and were intended to reduce soil erosion and reduce discoloration of the water from tannins in oak leaves. There may have been an interest in timber production. In the native hardwood forests, chestnut, which was affected by the chestnut blight (an introduced pest), was cut heavily in the 1920's and 1930's, for fuelwood for the Water Department boiler. Later, other hardwoods were cut. This practice continued until about 1950, when the Water Department switched to oil. These early thinnings are credited with helping develop the large oaks in some areas.

Most of the softwood plantations and some of the white pine was thinned (pulpwood) in the 1950's and early 1960's — interestingly, this practice faded when home freezers became popular

and the need for barrel staves for salted meat evaporated (Fred Hunt, pers. Comm.). Some of the white pine was pruned at that time to develop clear (valuable) lumber, but thinnings were not always carried out to take advantage of this. There is no record of activity in the late 1960's and through the 1970's.

An active era of forest management began in 1981 on the City of Northampton's Mountain Street watershed and in the mid 1980's on the City of Northampton's Ryan and West-Wately watershed. By the late 1980's, an effort was underway to carry out improvement cuts, thinnings, and initial regeneration cuts across both watersheds. This work, consisting of numerous permitted harvests marked by Karl Davies and carried out by many different loggers under his supervision, continued until around 2000, when work was put on hold by DPW decision. Karl Davies passed away in 2003, and no further work has been carried out on the watershed. The general affect of this work was to reduce competition among overstory trees, refocus future growth on trees with good form and growth potential, and begin to develop understories of desirable seedlings. Also at that time, there was a strong interest in generating revenue for acquisition of additional watershed lands.

The current era of forest management began in 2011 with a focus on establishing long-term forest management plans for the watershed lands. These plans (including the present plan) were intended to take stock of forest conditions and make recommendations that would help improve or maintain desirable forest conditions from a water-quality protection standpoint.

Overall forest health is good, as far as overstory trees are concerned, with the exception of red pine (plantation) and white ash. Most native forest areas are overcrowded and thus are not as vigorous as they could be, but the only decline phenomena seem to be in the red pine and the white ash. Red pine is declining in general throughout the region as well as on other DPW properties, hence the red pine is declining here also. Fortunately, there was only a limited indication of recent or immanent red pine mortality, and evidence of attack by Ips beetles was only noted in standing dead trees. White ash, a native, is also in poor health across its range. This phenomenon is not well explained, but the decline is recognizable by dieback at the top of the tree crown, an indicator of poor vigor that ultimately ends with the tree becoming a standing dead tree. The emerald ash borer, which was discovered in Massachusetts in 2012, and which has devastated ash (white ash and other species) in the Midwestern states where it has been established for 15 or more years, may someday affect the ash here as well, with the possibility of a total loss of ash.

More importantly for the long-term health of the forest, undoubtedly, is the prevalence of non-native invasive plant species — most notably oriental bittersweet — which, in conjunction with the action of wild (native) grape vines, undermines the longer-term prospects for growing any type of tall future forest at all. Other non-native invasive plants noted here included multiflora rose, Japanese barberry and bush honeysuckle. The infestation is concentrated in the plantations (and in shrub swamp areas) at this time, and is already hampering DPW's ability to harvest timber and develop a sustainable, multi-aged mix of native trees over time. If left unchecked, this mix of interfering vegetation, driven mainly by the action of vines, will continue to spread and thereby increase the level of interference with desirable forest conditions and processes.

Invasive species are present and pose a long-term threat to desired forest conditions. See discussion of forest health above and see also the Stand Descriptions section.

Main habitat types are maturing pine-oak-hardwood forest with sparse understory growth (due to overstory shade), tall softwood plantations, and a mix of wetlands including shrub swamp, shallow marsh, beaver pond, and other wetland, riparian, and stream features. Upland early successional habitat is lacking.

Unique cultural and physical features: (1) Roberts Meadow Brook is a major stream that feeds a drinking water system that has historically served as a back-up for the City of Northampton; (2) the land, which was known as "Kingsley Farm" at the time of its acquisition by the City in 1923, displays evidence of past agricultural use such as stone walls, barbed wire fence, and a row of planted sugar maples; (3) the land has seen significant gravel excavations; (4) early in the City's ownership, an effort was made to re-forest the land by planting conifers, reflecting ideas about watershed management that prevailed at that time; (5) Kingsley Lane is a discontinued road that enters onto the property from the north, off Chesterfield Road.

Water resources concerns are "elevated": This parcel falls within the watershed of a drinking water system that has historically served as a back-up for the City of Northampton, and includes its major tributary. Although nothing currently occurring on this property constitutes a threat to water quality, there is a longer-term threat posed by non-native invasive plants (discussed above).

Property-wide stewardship concerns include: (1) identifying and marking boundaries, addressing any issues of encroachment, and determining how to access the property feasibly for purposes of management; (2) controlling interfering vegetation (non-native invasive plants and native plants) to limit their potential harm to the forest (described above) and to allow silvicultural techniques to be applied; (3) using silviculture to improve forest vigor and begin to establish areas of young, desirable growth; (4) protecting the wood turtle in the eastern half of the property (state-listed as a species of "Special Concern" under the MA Endangered Species Act) if the land near Montague Road is to be harvested or otherwise treated.

Role/Impact wrt. the local economy

The most important economic role of this forest is to supply water to the reservoirs. The value of the water produced by the water supply is much more significant than the value of any forest products. Income from forest products plays a secondary role, and harvesting is designed to shape watershed forest conditions rather than to meet economic goals. From a "woodlot perspective", the combination of the Kingsley Parcel and the Roberts Meadow parcels is relatively large by Massachusetts standards, and can contribute positively to the local economy, providing work for foresters, loggers, truckers, and possibly local sawmills, firewood operations, and wood-chip-burning facilities (e.g. Cooley Dickinson Hospital). There has been no harvesting of timber on these lands over the last 10 years. Over the next ten years, the economic role played by timber could increase. Much of the volume that might be currently harvested is low-grade material, including firewood, softwood pulp, and potential chipwood. This can change

over time as management processes help higher quality trees develop and become available for harvest.

Role/Impact wrt. nearby Protected Lands

Water supply No impact is expected on nearby protected lands. Other nearby protected are already under Forest Stewardship Plans or are being brought under at this time.

Wildlife habitat No impact is expected. Any management undertaken is not expected to alter wildlife habitat in a significant way.

Recreation There is no (known) current recreation on this property.

The between-property impact of any management is expected to be essentially non-existent.

Summary of Management Recommendations

The landowner's main goals include (1) completing this plan as a way of taking stock of the property and identifying major concerns and opportunities going forward; (2) enrolling the property in DCR's Forest Stewardship Program and in DCR's Green Certification program; (3) address the property-wide concerns stated above.

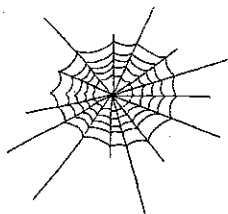
The property's potential to achieve the landowner's goals is outstanding, with notable challenges including (1) the presence of interfering vegetation and (2) the challenging access (Although there is good frontage along North Road, but streams, including Roberts Meadow Brook) run north-south and would have to be crossed to access the central and eastern parts of the property. Kingsley Lane once provided excellent access to the eastern part of the property, but it is discontinued, and any use of the road would have to be agreed to by its current owners.)

Working towards these goals, the main recommendations include

1. Complete this plan and file all paperwork with DCR
2. Mark all property boundaries.
3. Approach the northern abutter to address the encroachment.
4. Evaluate the options (chemical and non-chemical) for controlling interfering vegetation (oriental bittersweet and other non-native plants as well as wild grapes) and begin implementing an effort to control these plants.
5. If/when conditions allow, conduct silvicultural work described in this plan.

Stewardship Issues

Massachusetts is a small state, but it contains a tremendous variety of ecosystems, plant and animal species, management challenges, and opportunities. This section of your plan will provide background information about the Massachusetts forest landscape as well as issues that might affect your land. **The Stand Descriptions and Management Practices sections of your plan will give more detailed property specific information on these subjects tailored to your management goals.**



Biodiversity: Biological diversity is, in part, a measure of the variety of plants and animals, the communities they form, and the ecological processes (such as water and nutrient cycling) that sustain them. With the recognition that each species has value, individually and as part of its natural community, maintaining biodiversity has become an important resource management goal.

While the biggest threat to biodiversity in Massachusetts is the loss of habitat to development, another threat is the introduction and spread of invasive non-native plants. Non-native invasives like European Buckthorn, Asiatic Bittersweet, and Japanese Honeysuckle spread quickly, crowding out or smothering native species and upsetting and dramatically altering ecosystem structure and function. Once established, invasives are difficult to control and even harder to eradicate. Therefore, vigilance and early intervention are paramount.

Another factor influencing biodiversity in Massachusetts concerns the amount and distribution of forest growth stages. Wildlife biologists have recommended that, for optimal wildlife habitat on a landscape scale, 5-15% of the forest should be in the seedling stage (less than 1" in diameter). Yet we currently have no more than 2-3% early successional stage seedling forest across the state. There is also a shortage of forest with large diameter trees (greater than 20"). See more about how you can manage your land with biodiversity in mind in the "Wildlife" section below. (Also refer to *Managing Forests to Enhance Wildlife Diversity in Massachusetts* and *A Guide to Invasive Plants in Massachusetts* in the binder pockets.)



Rare Species: Rare species include those that are **threatened** (abundant in parts of its range but declining in total numbers, those of **special concern** (any species that has suffered a decline that could threaten the species if left unchecked), and **endangered** (at immediate risk of extinction and probably cannot survive without direct human intervention). Some species are threatened or endangered globally, while others are common globally but rare in Massachusetts.

Of the 2,040 plant and animal species (not including insects) in Massachusetts, 424 are considered rare. About 100 of these rare species are known to occur in woodlands. Most of these are found in wooded wetlands, especially vernal pools. These temporary shallow pools dry up by late summer, but provide crucial breeding habitat for rare salamanders and a host of other unusual forest dwelling invertebrates. Although many species in Massachusetts are adapted to and thrive in recently disturbed forests, rare species are often very sensitive to any changes in their habitat

Indispensable to rare species protection is a set of maps maintained by the Division of Fisheries and Wildlife's Natural Heritage & Endangered Species Program (NHESP) that show current and historic locations of rare species and their habitats. The maps of your property will be compared to these rare

species maps and the result indicated on the upper right corner of the front page of the plan. Prior to any regulated timber harvest, if an occurrence does show on the map, the NHESP will recommend protective measures. Possible measures include restricting logging operations to frozen periods of the year, or keeping logging equipment out of sensitive areas. You might also use information from NHESP to consider implementing management activities to improve the habitat for these special species.



Riparian and Wetlands Areas: Riparian and wetland areas are transition areas between open water features (lakes, ponds, streams, and rivers) and the drier terrestrial ecosystems. More specifically, a **wetland** is an area that has hydric (wet) soils and a unique community of plants that are adapted to live in these wet soils. Wetlands may be adjacent to streams or ponds, or a wetland may be found isolated in an otherwise drier landscape. A **riparian area** is the transition zone between an open water feature and the uplands (see Figure 1). A riparian zone may contain wetlands, but also includes areas with somewhat better drained soils. It is easiest to think of riparian areas as the places where land and water meet.

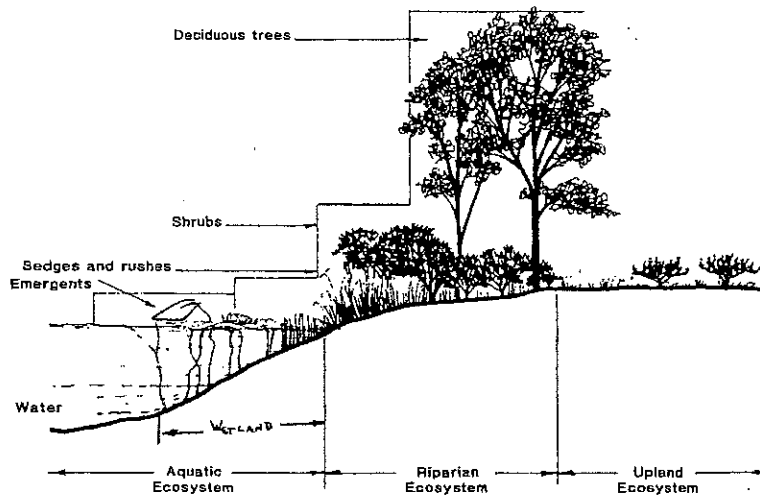


Figure 1: Example of a riparian zone.

The presence of water in riparian and wetland areas make these special places very important. Some of the functions and values that these areas provide are described below:

Filtration: Riparian zones capture and filter out sediment, chemicals and debris before they reach streams, rivers, lakes and drinking water supplies. This helps to keep our drinking water cleaner, and saves communities money by making the need for costly filtration much less likely.

Flood control: By storing water after rainstorms, these areas reduce downstream flooding. Like a sponge, wetland and riparian areas absorb stormwater, then release it slowly over time instead of in one flush.

Critical wildlife habitat: Many birds and mammals need riparian and wetland areas for all or part of their life cycles. These areas provide food and water, cover, and travel corridors. They are often the most important habitat feature in Massachusetts' forests.

Recreational opportunities: Our lakes, rivers, streams, and ponds are often focal points for recreation. We enjoy them when we boat, fish, swim, or just sit and enjoy the view.

In order to protect wetlands and riparian areas and to prevent soil erosion during timber harvesting activities, Massachusetts promotes the use of "Best Management Practices" or BMPs. Maintaining or reestablishing the protective vegetative layer and protecting critical areas are the two rules that underlie these common sense measures. DCR's Massachusetts Forestry Best Practices Manual (included with this plan) details both the legally required and voluntary specifications for log landings, skid trails, water bars, buffer strips, filter strips, harvest timing, and much more.

The two Massachusetts laws that regulate timber harvesting in and around wetlands and riparian areas are the Massachusetts Wetlands Protection Act (CH 131), and the Forest Cutting Practices Act (CH132). Among other things, CH132 requires the filing of a cutting plan and on-site inspection of a harvest operation by a DCR Service Forester to ensure that required BMPs are being followed when a commercial harvest exceeds 25,000 board feet or 50 cords (or combination thereof).



Soil and Water Quality: Forests provide a very effective natural buffer that holds soil in place and protects the purity of our water. The trees, understory vegetation, and the organic material on the forest floor reduce the impact of falling rain, and help to insure that soil will not be carried into our streams and waterways.

To maintain a supply of clean water, forests must be kept as healthy as possible. Forests with a diverse mixture of vigorous trees of different ages and species can better cope with periodic and unpredictable stress such as insect attacks or windstorms.

Timber harvesting must be conducted with the utmost care to ensure that erosion is minimized and that sediment does not enter streams or wetlands. Sediment causes turbidity which degrades water quality and can harm fish and other aquatic life. As long as Best Management Practices (BMPs) are implemented correctly, it is possible to undertake active forest management without harming water quality.



Forest Health: Like individual organisms, forests vary in their overall health. The health of a forest is affected by many factors including weather, soil, insects, diseases, air quality, and human activity. Forest owners do not usually focus on the health of a single tree, but are concerned about catastrophic events such as insect or disease outbreaks that affect so many individual trees that the whole forest community is impacted.

Like our own health, it is easier to prevent forest health problems than to cure them. This preventative approach usually involves two steps. First, it is desirable to maintain or encourage a wide diversity of tree species and age classes within the forest. This diversity makes a forest less susceptible to a single devastating health threat. Second, by thinning out weaker and less desirable trees, well-spaced healthy individual trees are assured enough water and light to thrive. These two steps will result in a forest of vigorously growing trees that is more resistant to environmental stress.



Fire: Most forests in Massachusetts are relatively resistant to catastrophic fire. Historically, Native Americans commonly burned certain forests to improve hunting grounds. In modern times, fires most often result from careless human actions. The risk of an unintentional and damaging fire in your woods could increase as a result of logging activity if the slash (tree tops, branches, and debris) is not treated correctly.

Adherence to the Massachusetts slash law minimizes this risk. Under the law, slash is to be removed from buffer areas near roads, boundaries, and critical areas and lopped close to the ground to speed decay. Well-maintained woods roads are always desirable to provide access should a fire occur.

Depending on the type of fire and the goals of the landowner, fire can also be considered as a management tool to favor certain species of plants and animals. Today the use of prescribed burning is largely restricted to the coast and islands, where it is used to maintain unique natural communities such as sandplain grasslands and pitch pine/scrub oak barrens. However, state land managers are also attempting to bring fire back to many of the fire-adapted communities found elsewhere around the state.



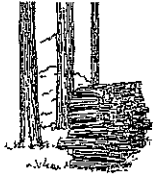
Wildlife Management: Enhancing the wildlife potential of a forested property is a common and important goal for many woodland owners. Sometimes actions can be taken to benefit a particular species of interest (e.g., put up Wood Duck nest boxes). In most cases, recommended management practices can benefit many species, and fall into one of three broad strategies. These are **managing for diversity, protecting existing habitat, and enhancing existing habitat.**

Managing for Diversity – Many species of wildlife need a variety of plant communities to meet their lifecycle requirements. In general, a property that contains a diversity of habitats will support a more varied wildlife population. A thick area of brush and young trees might provide food and cover for grouse and cedar waxwing; a mature stand of oaks provides acorns for foraging deer and turkey; while an open field provides the right food and cover for cottontail rabbits and red fox. It is often possible to create these different habitats on your property through active management. The appropriate mix of habitat types will primarily depend on the composition of the surrounding landscape and your objectives. It may be a good idea to create a brushy area where early successional habitats are rare, but the same practice may be inappropriate in the area's last block of mature forest.

Protecting Existing Habitat – This strategy is commonly associated with managing for rare species or those species that require unique habitat features. These habitat features include vernal pools, springs and seeps, forested wetlands, rock outcrops, snags, den trees, and large blocks of unbroken forest. Some of these features are rare, and they provide the right mix of food, water, and shelter for a particular species or specialized community of wildlife. It is important to recognize their value and protect their function. This usually means not altering the feature and buffering the resource area from potential impacts.

Enhancing Existing Habitat – This strategy falls somewhere between the previous two. One way the wildlife value of a forest can be enhanced is by modifying its structure (number of canopy layers, average tree size, density). Thinning out undesirable trees from around large crowned mast (nut and fruit) trees will allow these trees to grow faster and produce more food. The faster growth will also accelerate the development of a more mature forest structure, which is important for some species. Creating small gaps or forest openings generates groups of seedlings and saplings that provide an additional layer of cover, food, and perch sites.

Each of these three strategies can be applied on a single property. For example, a landowner might want to increase the habitat diversity by reclaiming an old abandoned field. Elsewhere on the property, a stand of young hardwoods might be thinned to reduce competition, while a “no cut” buffer is set up around a vernal pool or other habitat feature. The overview, stand description and management practice sections of this plan will help you understand your woodland within the context of the surrounding landscape and the potential to diversify, protect or enhance wildlife habitat.



Wood Products: If managed wisely, forests can produce a periodic flow of wood products on a sustained basis. Stewardship encompasses finding ways to meet your current needs while protecting the forest’s ecological integrity. In this way, you can harvest timber and generate income without compromising the opportunities of future generations.

Massachusetts forests grow many highly valued species (white pine, red oak, sugar maple, white ash, and black cherry) whose lumber is sold throughout the world. Other lower valued species (hemlock, birch, beech, red maple) are marketed locally or regionally, and become products like pallets, pulpwood, firewood, and lumber. These products and their associated value-added industries contribute between 200 and 300 million dollars annually to the Massachusetts economy.

By growing and selling wood products in a responsible way you are helping to our society’s demand for these goods. Harvesting from sustainably managed woodlands – rather than from unmanaged or poorly managed forest – benefits the public in a multitude of ways. The sale of timber, pulpwood, and firewood also provides periodic income that you can reinvest in the property, increasing its value and helping you meet your long-term goals. Producing wood products helps defray the costs of owning woodland, and helps private landowners keep their forestland undeveloped.



Cultural Resources: Cultural resources are the places containing evidence of people who once lived in the area. Whether a Native American village from 1,700 years ago, or the remains of a farmstead from the 1800’s, these features all tell important and interesting stories about the landscape, and should be protected from damage or loss.

Massachusetts has a long and diverse history of human habitation and use. Native American tribes first took advantage of the natural bounty of this area over 10,000 years ago. Many of these villages were located along the coasts and rivers of the state. The interior woodlands were also used for hunting, traveling, and temporary camps. Signs of these activities are difficult to find in today’s forests. They were obscured by the dramatic landscape impacts brought by European settlers as they swept over the area in the 17th and 18th centuries.

By the middle 1800’s, more than 70% of the forests of Massachusetts had been cleared for crops and pastureland. Houses, barns, wells, fences, mills, and roads were all constructed as woodlands were converted for agricultural production. But when the Erie Canal connected the Midwest with the eastern cities, New England farms were abandoned for the more productive land in the Ohio River valley, and the landscape began to revert to forest. Many of the abandoned buildings were disassembled and moved, but the supporting stonework and other changes to the landscape can be easily seen today.

One particularly ubiquitous legacy of this period is stone walls. Most were constructed between 1810 and 1840 as stone fences (wooden fence rails had become scarce) to enclose sheep within pastures, or to

exclude them from croplands and hayfields. Clues to their purpose are found in their construction. Walls that surrounded pasture areas were comprised mostly of large stones, while walls abutting former cropland accumulated many small stones as farmers cleared rocks turned up by their plows. Other cultural features to look for include cellar holes, wells, old roads and even old trash dumps.

History of Natural Disturbance:

As noted above, the mid 19th century was the height of forestland clearing for agriculture and pasturing. The availability of richer, more productive farmland in the Midwest resulted in farm abandonment and subsequent regrowth of white pine, chestnut, and mixed hardwoods including red oak. In the early 20th century these stands, particularly white pine, were cut to supply the wood container industry. Farm activity on the newly cleared land was truncated by World Wars I and II and brought about another wave of farm abandonment and regrowth. Natural disturbances since 1900 include the Chestnut blight of 1900-1908, the hurricane of 1938, the Gypsy Moth outbreak of 1980-1982, wind events, and ice damage, most notably in December 2008.



Recreation and Aesthetic Considerations: Recreational opportunities and aesthetic quality are the most important values for many forest landowners, and represent valid goals in and of themselves. Removing interfering vegetation can open a vista or highlight a beautiful tree, for example. When a landowner's goals include timber, thoughtful forest management can be used to accomplish silvicultural objectives while also reaching recreational and/or aesthetic objectives. For example, logging trails might be designed to provide a network of cross-country ski trails that lead through a variety of habitats and reveal points of interest.

If aesthetics is a concern and you are planning a timber harvest, obtain a copy of this excellent booklet: *A Guide to Logging Aesthetics: Practical Tips for Loggers, Foresters & Landowners*, by Geoffrey T. Jones, 1993. (Available from the Northeast Regional Agricultural Engineering Service, (607) 255-7654, for \$7). Work closely with your consultant to make sure the aesthetic standards you want are included in the contract and that the logger selected to do the job executes it properly. The time you take to plan ahead of the job will reward you and your family many times over with a fuller enjoyment of your forest, now and well into the future.

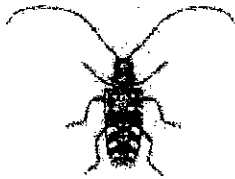


Invasive Species Management: Invasive species pose immediate and long-term threats to the woodlands of MA. Defined as a non-native species whose introduction does or is likely to cause economic or environmental harm or harm to human, animal, or plant health, invasives are well-adapted to a variety of environmental conditions, out-compete more desirable native species, and often create monocultures devoid of biological diversity. The websites of the Invasive Plant Atlas of New England, www.nbi-nin.ciesin.columbia.edu/ipane, and the New England Wildflower Society,

www.newfs.org are excellent sources of information regarding the identification and management of invasive plants. Some of the common invasive plants found in MA are listed below.

- Oriental Bittersweet (*Celastrus orbiculata*)
- Glossy Buckthorn (*Frangula alnus*)
- Multiflora Rose (*Rosa multiflora*)
- Japanese Barberry (*Berberis thunbergii*)
- Japanese Knotweed (*Fallopia japonica*)
- Autumn Olive (*Eleaegnus umbellata*)

Early detection and the initiation of control methods soon after detection are critical to suppressing the spread of invasive species. Selective application of the proper herbicide is often the most effective control method. See the next section for information on the use of chemicals in forest management activities.



Asian Longhorned Beetle

Pesticide Use

Pesticides such as herbicides, insecticides, fungicides, and rodenticides are used to control “pests”. A pest is any mammal, bird, invertebrate, plant, fungi, bacteria or virus deemed injurious to humans and/or other mammals, birds, plants, etc. The most common forest management use of a pesticide by woodland owners is the application of herbicide to combat invasive species. MA DCR suggests using a management system(s) that promotes the development and adoption of environmentally friendly no-chemical methods of pest management that strives to avoid the use of chemical pesticides. If chemicals are used, proper equipment and training should be utilized to minimize health and environmental risks. In Massachusetts, the application of pesticides is regulated by the MA Pesticide Control Board. For more information, contact MA Department of Agricultural Resources (MDAR), Pesticide Bureau at (617) 626-1776

Please refer to FSC Pesticides Policy: Guidance on Implementation (FSC-GUI30-001 Version 2-0 EN, May 5, 2007) for information on chemicals banned from use on MA Private Lands Group Certification member properties.

This is your Stewardship Plan. It is based on the goals that you have identified. The final success of your Stewardship Plan will be determined first, by how well you are able to identify and define your goals, and second, by the support you find and the resources you commit to implement each step.

It can be helpful and enjoyable to visit other properties to sample the range of management activities and see the accomplishments of others. This may help you visualize the outcome of alternative management decisions and can either stimulate new ideas or confirm your own personal philosophies. Don't hesitate to express your thoughts, concerns, and ideas. Keep asking questions! Please be involved and enjoy the fact that you are the steward of a very special place.



STAND DESCRIPTIONS

Kingsley Farm Lot: Notes Applying to All Stands

Stand Objectives: For all stands, the objectives are Forest Stewardship & Green Certification.

Delineations of Stands: Stand 1 encompasses all the native forest areas. These tend to be dominated by white pine, red oak, and a hardwood mix that includes sugar maple and white ash. In these areas, hemlock primarily occurs on a scattered basis as a midstory tree. Stand 2 is a plantation of Norway spruce and white pine. Stand 3 is a plantation of red pine with an emerging hardwood mid-story and understory that includes a strong component of sugar maple. Stand 4 is a significantly altered wetland area with shrub swamp, shallow marsh and beaver pond areas and a limited area of included upland. Much of Stand 4 was once excavated for gravel.

Stand	Type	Acres	MSD	BA	Mbf per acre	Cords per acre	Site Index WP	R*	Growth Rate (Mbf/yr)
1	WH	49.8	13.1	141	10.7	11	68	2	8
2	SP/WP	12.5	15.5	108	15.3	3	68	3	6
3	RP	17.0	8.8	109	7.9	8	68	4	3
4	SS	17.24	N/A	N/A	N/A	N/A	N/A	N/A	0.0
96.54									17

*R = severity ranking for non-native invasive plants (see below)

Ranking system for non-native invasive plant species: To assess the extent and severity of non-native invasive vegetation, all forested stands were ranked using the following system (see below). This same ranking system was used in the 2012 Forest Stewardship Plans at the Ryan & West-Whately Reservoirs and at the Mountain Street Reservoir. Because of the ability of non-native invasive vegetation to aggressively interfere with desired silvicultural outcomes, any stands ranked 3, 4 or 5 were considered "not suitable" for silviculture. Non-native invasive plants detract from desirable watershed forest conditions by aggressively competing with desirable native vegetation, including tree seedlings. Therefore, a major objective of watershed management is to prevent any spread of these plants. The non-native invasive plant that currently and foreseeably poses the single greatest risk on DPW properties is oriental (i.e. asiatic) bittersweet, a vine that is commonly found across the watershed. Buckthorn spp. (both European and glossy buckthorns), which also competes very aggressively with desirable native vegetation was not noted.

(Rank = 1) ESSENTIALLY ABSENT (none observed or, if any, then extremely sparse; no appreciable invasive plant seed bank expected).

STAND DESCRIPTIONS

(Rank = 2) MINOR AND READILY TREATABLE. (Minor and readily treatable, and therefore still suitable for silviculture if treated; possible presence of localized invasive plant seed bank, but widespread invasive plant seed bank not expected).

— (stands ranked 3 or higher were considered not suitable for silviculture) —

(Rank = 3) MODERATE TO SEVERE. Moderate to severe, and therefore cannot be considered available for silviculture within a 5-10 year period/until 5-10 years after receiving treatment and, under monitoring with follow-up treatment as needed until plants and seedbank are controlled, and the area is downgraded to (2) or (1).

(Rank = 4) SEVERE. Severe infestation with no expectation of silviculture within 10 years even if treated. Often, the major difference between a rank of 4 and 5 is that a stand with a rank of 4 still has a forest overstory. However, there is no expectation that the existing overstory will be replaced by a new overstory of desirable trees as, over time, ongoing natural (and/or man-made) disturbances occur.

(Rank = 5) IN NEED OF RESTORATION: the area no longer meets any criteria of a desirable watershed forest — the site is no longer dominated by desirable forest vegetation and/or there is no expectation that the site will be, or will continue to be, dominated by desirable forest vegetation within any foreseeable timeframe without complete intervention/restoration.

Method for volume growth rate: For all stands, stewardship-plan growth rates were based on the DCR/USFS Forest-Inventory-and-Analysis published average rate of 162 board feet per acre per year. If any adjustments were made to this figure, this was discussed in the specific stand description. If a stand was not forested, then a growth rate of zero bf/acre/yr was used.

Field method for volume per acre: for all forested stands with timber, a nested point-sampling cruise was conducted using a BAF-10 prism for “count trees” and a BAF-40 prism for volume trees (diameter and height) (see “Using a large-angle gauge to select trees for measurement in variable plot sampling”, Marshall, Lles and Bell, Canadian Journal of Forest Research 34: 840-845 (2004)). See also: “Is BAF 10 a Good Choice for Point Sampling, Wiant, Yandle and Andreas, Journal of Forestry, pp. 23 & 24, June, 1984. Product volumes are calculated in an Excel spreadsheet using formulas published in Mawson and Rivers.

Field method for site index: Site index is a rough measure of soil fertility for species-specific tree growth. The site index is considered to be the height, in feet, of a vigorous, free-to-grow tree at age 50. A higher site index represents greater soil fertility for the species in question. Site indices published in the NRCS Soil Survey of Hampshire

STAND DESCRIPTIONS

County, Central Part, Spring, 2013 were used. As needed, the published site indices were adjusted to reflect field observations of tree vigor and other and in-stand features.

Are there slopes greater than 30%? No. The sole exception is an area of steep, gravelly bank on the north side of Roberts Meadow Brook.

Is this soil highly erodible? No.

Protection from fire: No evidence of recent wildfire. In general, the main threat of wildfire is careless, unauthorized recreational use. There are no well-established trails to channel recreational use onto this property and therefore the risk of an accidental fire is minimal.

STAND DESCRIPTIONS

Overview of Roberts Meadow Soils

Roberts Meadow Soils (*Kingsley Farm Tract soils shown in bold italics*)

Unit	Short Name	Name
8A	Limerick	Limerick silt loam, 0 to 3 percent slopes
88B	Ridgebury	Ridgebury fine sandy loam, 3 to 8 percent slopes, very stony
88A	Ridgebury	Ridgebury fine sandy loam, 0 to 3 percent slopes, very stony
711E	Charlton-Hollis	Charlton-Rock outcrop-Hollis complex, steep (Charlton)
711E	Charlton-Hollis	Charlton-Rock outcrop-Hollis complex, steep (Hollis)
711E	Charlton-Hollis	Charlton-Rock outcrop-Hollis complex, steep outcrop
5A	Saco	Saco silt loam, 0 to 3 percent slopes
4A	Rippowam	Rippowam fine sandy loam, 0 to 3 percent slopes
406D	Charlton	Charlton fine sandy loam, 15 to 25 percent slopes, very stony
406C	Charlton	Charlton fine sandy loam, 8 to 15 percent slopes, very stony
406B	Charlton	Charlton fine sandy loam, 3 to 8 percent slopes, very stony
31A	Walpole	Walpole fine sandy loam, 0 to 3 percent slopes
311C	Woodbridge	Woodbridge fine sandy loam, 8 to 15 percent slopes, very stony
311B	Woodbridge	Woodbridge fine sandy loam, 3 to 8 percent slopes, very stony
306D	Paxton	Paxton fine sandy loam, 15 to 25 percent slopes, very stony
306C	Paxton	Paxton fine sandy loam, 8 to 15 percent slopes, very stony
260B	Sudbury	Sudbury fine sandy loam, 3 to 8 percent slopes
260A	Sudbury	Sudbury fine sandy loam, 0 to 3 percent slopes
254C	Merrimac	Merrimac fine sandy loam, 8 to 15 percent slopes
254B	Merrimac	Merrimac fine sandy loam, 3 to 8 percent slopes
253D	Hinckley	Hinckley loamy sand, 15 to 25 percent slopes
253C	Hinckley	Hinckley loamy sand, 8 to 15 percent slopes
253B	Hinckley	Hinckley loamy sand, 3 to 8 percent slopes
600	Old Gravel Pit	Pits, gravel

Source: NRCS Soil Survey of Hampshire County, Central Part, Spring, 2013.

STAND DESCRIPTIONS

Description of Soils: (Source: NRCS Soil Survey of Hampshire County, Central Part, Spring, 2013)

Walpole: The Walpole component makes up 80 percent of the map unit. Slopes are 0 to 3 percent. This component is on terraces. The parent material consists of sandy glaciofluvial deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 5 percent. This soil meets hydric criteria.

Merrimac: The Merrimac component makes up 85 percent of the map unit. Slopes are 3 to 15 percent. This component is on outwash plains. The parent material consists of friable loamy eolian deposits over loose sandy glaciofluvial deposits derived from granite and gneiss. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This soil does not meet hydric criteria.

Sudbury: The Sudbury component makes up 85 percent of the map unit. Slopes are 0 to 8 percent. This component is on outwash plains. The parent material consists of friable loamy eolian deposits over loose sandy glaciofluvial deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 27 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 4 percent. This soil does not meet hydric criteria.

Brief Discussion of Soils: The core area of the Kingsley Farm parcel (and Stands 1, 2 & 3) is comprised of Walpole fine sandy loam (see attached soil map). Merrimac and Sudbury fine sandy loams occur in peripheral areas, as does the old gravel pit, which is presently a non-forested wetland. The forested soils are deep and composed of gravel deposits left in the wake of glacial activity. The Walpole soil is close to the water table and is wet at or below the surface for much of the non-growing season. During the growing season, the water table drops, and the soil does not have good moisture holding capacity. Thus, this soil is both hydric and droughty, which can result in the growth of lower-quality red oak timber. The Sudbury is elevated above the water table and is droughty, which is reflected in the tendency to grow lower-quality red oak timber. The

Stand Descriptions Page 5

Roberts Meadow Reservoir (Kingsley Farm) Town(s) Westhampton Owner(s) City of Northampton DPW

STAND DESCRIPTIONS

Merrimac is intermediate and, overall, will produce the highest quality red oak timber. Overall, forest is the natural cover for these areas. Other than along stream banks, the risks to water quality (erosion and sedimentation) are minimal.

The natural soil of Stand 4 was removed during gravel operations and was not further evaluated in the Soil Survey. It is a good assumption that the remaining material is a gravel substrate that is, apparently, flooded or saturated throughout most or all of the year. With the exception of remnant upland scraps, this area, with its gravel-bank history and, additionally, its tendency to be flooded by beavers, is not well-suited to tree growth.

STAND DESCRIPTIONS

Individual Stand Descriptions:

Stand	Type	Acres	MSD	BA	Mbf per acre	Cords per acre	Site Index WP	Growth Rate (Mbf/yr)
1	WH	49.8	13.1	141	10.7	11	68	8.1

Special water quality concerns (for stands within a reservoir watershed): Avoid any inputs of sediments into Roberts Meadow Brook and into the unnamed seasonal streams near North Road. If any logging occurs, any stream crossings and any work near streams will be designed to avoid sedimentation. Otherwise, there are no particular risks of sediment inputs from this stand over the next 10 years. However, over the longer-term, the threat of oriental bittersweet vines and other non-native invasive plants, as well as wild grapes, may compromise DPW's ability to maintain the type of functioning forest canopy that is considered to provide the best protection for water quality.

Silvicultural Status (options are "suitable" or "not suitable"): suitable.

Overstory: Forest Type and Condition: Stand 1 encompasses all the native forest areas on the Kingsley Farm parcel. This is a heterogenous mix in which the most common trees are white pine, red oak, and, on areas close to the water table, a hardwood mix that includes sugar maple, red maple, white ash, minor amounts of white oak, black oak, and pignut hickory, and a small concentration of black cherry. Black locust occurs together with sugar maple in some areas and around the wetland in the SW area. Hemlock occurs primarily on a scattered basis as a midstory tree. However, there is a dense area of mid-story and overstory (rough) hemlock, mixed with red, black and white oak, on a roughly 5-acre gravelly, droughty shelf above the eastern bank of Roberts Meadow Brook as it comes on to the property from the north. In a number of areas, the white pine (with, or without red oak) forms a very tall (>100'), very crowded canopy (a thinning marked in blue paint 10 or more years ago was never carried out). The largest of these areas is roughly 9 acres along North Road. Sometimes, white pine occurs in a nearly pure concentration, such as the very tall pine on the west side of Kingsley Lane, and along the parts of Roberts Meadow Brook. In other areas, white pine is a scattered overstory tree within an otherwise hardwood-dominated area, including a central area of about 18 acres, and several acres in the northeast part of the stand. Some of the hardwoods are impressive in height and diameter, including red oak, white oak, sugar maple, red maple, white ash, and black cherry, but many trees are of rough timber quality. Red oaks seem to have the best timber quality overall. In general, the white ash appears to be in poor health, with tops dying back on many trees. There is one concentration of large, mature black cherry (along the western end of Stand 2). Stand 1 also includes about 5 acres of shrub swamp, red maple swamp, and wet riparian area along the unnamed streams near north road. Overall white pine timber quality is average.

Understory: evergreen wood fern, prickly dewberry, Canada mayflower and starflower

Stand Descriptions Page 7

Roberts Meadow Reservoir (Kingsley Farm) Town(s) Westhampton Owner(s) City of Northampton DPW

STAND DESCRIPTIONS

Desirable Tree Regeneration (species and distribution) for future overstory:

Completely lacking in most areas due to overstory shade. The exception is in areas with a strong presence of ash. These areas have sugar maple saplings that could be viable if released. Beech is scattered throughout.

Interfering native vegetation: Wild grapes generally occur as large vines only on a scattered basis in this stand, especially in the area between the two unnamed streams, and could be controlled by cutting. The exception is in the area between the two unnamed streams in the western part of the property, where there is a concentration of large grape vines. No logging is planned for this area, and the grapes could be controlled by cutting. Other interfering vegetation (witch hazel, beech, mountain laurel) did not appear to be a problem, but thick hayscented fern may inhibit seedling establishment in some areas.

Other native understory vegetation (species and distribution): Most of the upland ground vegetation is sparse due to overstory shade. Evergreen woodfern was common throughout. Christmas fern, hayscented fern (see below), poison ivy, and clubmosses were apparent at the time of this writing (late winter) as well. Canada mayflower and starflower are probably abundant here as well.

Non-native invasive vegetation (species, distribution/severity) (see "Notes applying to all stands" above): Severity level is 2 overall, but varies between 1 and 3. Most areas were free of invasives (R=1). Areas with R = 3 included the lower portion of the included shrub swamp near the southwestern corner. Here bittersweet, barberry, multiflora rose are well established. The other area with R = 3 is along the north side of Stand 2, within a grove of white pine, where, ca. 20 years ago, small groups of roughly 10 pines were cut. Now these small patches are thick with bittersweet vines (and, to a lesser extent, grapes) that have climbed up onto and bent over 20'-30' hardwood saplings that came in after the cutting.

The abundant oriental bittersweet *seed source* in adjacent Stands 2 & 3 could eventually lead to bittersweet becoming established in other areas of Stand 1 as well. Seed-bearing bittersweet was noted on the parcel to the north and to the northwest. If any effort is made to control bittersweet on this property, it would greatly add to the overall chances of success if these small, abutting bittersweet populations could be controlled as well.

Black locust is somewhat abundant on both the east and west sides of the swamp and along the central part of Roberts Meadow Brook, but is not vigorous and is not really posing a problem (in fact, as it dies back it may very well release the sugar maple).

Soils (type, moisture, drainage and productivity): Soils are Walpole, Merrimac and Sudbury (See "Overview of Soils" above).

STAND DESCRIPTIONS

For tree growth purposes: These soils are well-suited to growing a range of native trees. Though the site indices (for white pine) are identical for the three soils, the Merrimac produces the best overall quality of red oak and white pine.

For logging purposes: These soils are well-suited to logging activity as long as water tables are low or the ground is frozen. The main challenges are posed by streams or wetlands that need to be crossed to access the upland areas.

Habitat:

General Habitat: Tall, closed-canopy hardwood and softwood forest with hard-mast-bearing trees (oaks and, to a minor extent, hickories) and a small component of soft-mast-bearing trees (black cherries) with few large snags but quite a few large medium-sized downed trees (many of which are ash). There are various streams and wetlands. A porcupine burrow was noted in the gravelly soil (pers. obs. — normally, porcupines den in large, hollow trees or logs or amongst rock features, all of which are mostly lacking here. I have never noticed a porcupine burrow in the ground).

Do wetlands occupy more than 10% of this stand? No.

Were vernal pools identified/mapped for this stand? (if "yes", how many): No.

Are NHESP layers indicated for this stand? (if "yes", describe) Yes. A small part of a larger NHESP polygon (presumed to be wood turtle) is indicated for this stand.

Other Special Habitat (elements to preserve) (e.g. tall ledge outcrops, etc.): protect the undisturbed quality of Roberts Meadow Brook by avoiding, if possible, the creation of a crossing for logging (this could damage banks at the crossing site and then invite ATV use). If any crossing is created, it should be thoroughly blocked afterwards. Protect wood turtle, which can be accomplished by limiting logging activity to the period November 1 to March 31 (which protects turtles because they are said to be dormant in streams during this time rather than crawling across the land where they can be inadvertently crushed). Forest Cutting Permits issued by DCR are likely to include this restriction as a condition

Special risks to habitat: The possibility of bittersweet and grapes spreading in and around the shrub-swamp area if canopy gaps are created by microbursts, other storms, silviculture, or by the actions of vines themselves.

Desired habitat modifications (options will vary, including "none"): Treatment of invasives and grapes to reduce their potential as seed sources and to prevent vines from overtaking canopy trees and creating self-perpetuating, self-enlarging gaps in areas that are already infested with invasives or grapes.

STAND DESCRIPTIONS

Historical/archaeological/contemporary: Barbed wire fence and, to a limited extent, stone walls are found around the perimeter and interior (see Forest stand and Boundary Map). An old road (Kingsley Lane) is still evident. A segment of stone wall and row of old planted sugar maples follows the bed of this road. If Kingsley Farm was ever located here, almost all traces of it have vanished. Perhaps any buildings were torn down by the City after the taking of the land (the deed refers to "buildings thereon"). There is a knoll at the southern end of Kingsley Lane that may have been a homestead site. There is no apparent cellar hole, but there is a hole at the top of the knoll that may be a pushed-in cellar hole. At the eastern end of the knoll there is a face of piled stones that may have been the upper entry to a two-level barn.

There is a small (ca. 1-acre) encroachment area (see "e" on the Forest Stand & Boundary Map). The encroachment includes a small area of marginal pasture in active use that is connected to the off-property pasture to the north enclosed on the west, south and east by older barbed wire and more recent electric fence. Most of the encroachment is part of the same run of forest as the rest of Stand 1.

Management history: No evidence of logging in recent decades. Some old stumps in the central part seem to be from hardwoods – possibly black locust – that was cut long ago. A thinning was marked by previous DPW forester Karl Davies (old blue paint is still evident) but was never carried out.

Desired future condition: A multi-aged, mixed-species forest of vigorous trees that is free of the influence of non-native invasive plants and other interfering factors.

Silvicultural ideas: Assuming access was conducive and interfering vegetation in nearby stands was not prevalent, it would make sense to do the following: (1) conduct a thinning in the white pine and oak along North Road (ca. 5 acres) to promote vigor in selected pines and oaks; (2) conduct a selection system cut in the central part (combining thinning and small openings to begin to diversify the forest structure while promoting seed sources of oaks including white oak, hickory, black cherry, and sugar maple) (ca. 18 acres); (3) regenerate (using a two-stage or three-stage irregular shelterwood) the entire shelf of land between Roberts meadow Brook and Kingsley Lane (ca. 7 acres); (4) thin the hardwood stand on the east side of Kingsley Lane to promote the growth and longevity of selected hardwoods (oaks, hickories, sugar maples, etc.) (ca. 4 acres); and (5) leave uncut the remaining areas such as the shrub swamp and feeder streams, the encroachment area, and the riparian areas along Roberts Meadow Brook. The net effect of this work (cutting on roughly 34 of 50 acres) would be to promote vigor, seed production, structural diversity, overstory longevity, habitat and to generate a modest amount of income.

Discussion of silvicultural ideas: The thinning along North Road would be good to do. Access is feasible. The small size of the job is a limiting factor. The lower quality of the pine to be cut is also a limitation. It may be difficult to find an appropriate logger to do this job. But it may be the most do-able of the ideas.

STAND DESCRIPTIONS

The central area is difficult to access without using abutting property and would involve crossing at least one stream or crossing wet ground which would cause undesired disturbance. Though the impact of crossing these streams would be minimized if the ground were frozen, the combination of low, wet banks as well as a steep, seepy bank make this crossing challenging. An old skid road through Stand 3 leads over toward the gravel pit on the abutting parcel to the south. Apparently, these abutters have granted permission in the past. The skid road appears to stay on well-drained, gravelly soil, and seems quite usable. There is a risk that bittersweet and/or grapes may seed in and take advantage of any disturbance and, in places, the good access to moisture.

The shelf above Roberts Meadow Brook (on the west side of Kingsley Lane) would be well-suited to the type of cut proposed, but the (traditional) access would have to be by permission (effectively right past the abutter's house) and the situation would have to be sounded out to see if the abutters would welcome the type of habitat-changing cut proposed (right in their back yard) or whether they prefer things "just the way they are". Another option might be to come in, by permission, from the western abutter of the traditional access. This would be across a hayfield that looks gravelly and well-drained, and then through a connecting forest edge area (pine grove). Unfortunately, there is a small infestation of bittersweet (vines ca. 1" diameter) at the edge of this pine grove. It would not be good to create any disturbance in this route of access unless the vines were treated (killed) with herbicide (to prevent sprouting).

Thinning in the area east of Kingsley Lane would benefit overstory trees but there is a risk that any disturbance on this mesic soil would allow bittersweet to become established.

Recommended management for the next 10 years: Taking into account the limitations of access and the intention of preventing the spread of interfering vegetation (especially to the central part of the stand), the recommended steps would be (1) mark boundaries, (2) control (by cutting) grape vines, (3) control non-native invasive plants in the swampy area and on a spot basis, (4) use the silvicultural method known as thinning to improve vigor in selected overstory trees along North Road (5 acres); (5) develop a landing for logging access to accomplish the previous step; (6) address the encroachment described above (begin by contacting the abutter and finding out the background of this).

STAND DESCRIPTIONS

Stand	Type	Acres	MSD	BA	Mbf per acre	Cords per acre	Site Index WP	Growth Rate (Mbf/yr)
2	SP/WP	12.5	15.5	108	15.3	3	68	6.1

Special water quality concerns (for stands within a reservoir watershed): Same as Stand 1.

Silvicultural Status (options are "suitable" or "not suitable"): NOT suitable.

Overstory: Forest Type and Condition: This is a tall plantation of Norway spruce and white pine straddling Roberts Meadow Brook. On the west side of the brook, there is only Norway spruce. On the east side of the brook, the spruce and pine are mixed. The immediate riparian areas of the brook was not planted to conifers, but instead, has grown into a mix of native sugar maple, other native hardwoods, and introduced black locust.

In many respects, this plantation has been a great success. The spruce and white pine are tall, well-formed, and loaded with quality timber. Timber quality is excellent for both species. Though this is "normal" for Norway spruce, it is uncommon to see such tall, straight white pine. There may have been a positive "training effect" exerted on the pine by the Norway spruce. It also appears these plantations were thinned early on, and the east side was thinned again about 20 years ago. The past thinnings have helped maintain vigor, but most areas of the stand are once again overcrowded and will be likely to lose vigor over time unless they are thinned. All things being equal, this would be the time to do another round of thinning, but the significant challenges of access and interfering vegetation (discussed below) may prevent or delay this.

On the east side there are a few black cherries mixed in, including one tree that, at 33" diameter and with a tall, straight trunk, is remarkable in size and form (for a black cherry). This may also be a reflection of the Norway spruce's tall, straight growth form. But it also illustrates that all three species (Norway spruce, white pine and black cherry) are able to get abundant water and nutrients on this site.

The riparian sugar maple is pole-sized and is intermingled with black locust. The black locust looks weak and may be in a prolonged decline, which would serve to slowly release the sugar maple. The biggest threat to the sugar maple is probably the risk of being cut by beavers (or grown into and overtopped by vines).

On the west side, in the interface with the red pine stand (Stand 3), there is an area which (probably due to cutting) has a fairly open canopy and which is now completely overrun with bittersweet and grapes. This self-perpetuating, self-enlarging area poses a threat to both stands.

STAND DESCRIPTIONS

The extent of the original plantation has shrunk due to the action of beavers on the east side of Roberts Meadow Brook. A few of the planted spruce occur in an area that is now considered part of Stand 4 (shrub swamp).

Understory:

Desirable Tree Regeneration (species and distribution) for future overstory:

Scattered white pine, Norway spruce and black birch on the east side. A thick understory of black birch with heights up to 30' under the closed canopy on the west side, but reaching 40' or more in small gaps. On both sides, in scattered larger gaps, any tree regeneration is overrun with vines (grapes and bittersweet).

Interfering native vegetation: Wild grapes do not generally occur as large vines but have popped up and colonized openings with mats of aggressive new vines (together with bittersweet). Other interfering vegetation (witch hazel, beech, mountain laurel) did not appear to be a problem, but thick hayscented fern may inhibit seedling establishment in some areas.

Other native understory vegetation (species and distribution): Same as Stand 1.

Non-native invasive vegetation (species, distribution/severity) (see "Notes applying to all stands" above): Severity level is 3 overall, but varies between 1 and 4. Some areas on both sides of the brook were free of invasives. But other areas were heavily infested with bittersweet. The degree of infestation reflected the degree of disturbance, with bittersweet filling small openings created by past logging and bending over hardwood saplings. The abundant oriental bittersweet seed source in adjacent Stand 3 adds to the risk.

Black locust occurs on both the east and west sides of the brook, but is not vigorous and is not really posing a problem (and may actually help the sugar maple as it dies back).

Soils (type, moisture, drainage and productivity): Soil is Walpole (See "Overview of Soils" above).

For tree growth purposes: This soil (in this particular location) is apparently well-suited to growing Norway spruce, white pine and black cherry. The site index for red maple is very high. Apparently, these trees are able to function well within the framework of a fluctuation water table and low moisture-holding capacity.

For logging purposes: This soil is well-suited to logging activity as long as water tables are low or the ground is frozen. The main challenges are posed by the brook or that may need to be crossed.

STAND DESCRIPTIONS

Habitat:

General Habitat: Tall, closed-canopy softwoods of cone-bearing age and a small component of soft-mast-bearing trees (large black cherries) with few or no large snags but with a number of medium-sized downed logs. Roberts Meadow Brook (a major stream) flows through the stand.

Do wetlands occupy more than 10% of this stand? No.

Were vernal pools identified/mapped for this stand? (if "yes", how many): No.

Are NHESP layers indicated for this stand? (if "yes", describe) Yes. Most of this stand falls within a larger NHESP polygon (presumed to be wood turtle) is indicated for this stand.

Other Special Habitat (elements to preserve) (e.g. tall ledge outcrops, etc.): protect the black cherries from any logging or vines; preserve the undisturbed quality of Roberts Meadow Brook (see Stand 1).

Special risks to habitat: The possibility of bittersweet and grapes spreading throughout the stand, pulling it down and preventing and new tree growth if canopy gaps are created by microbursts, other storms, silviculture, or by the actions of vines themselves.

Desired habitat modifications (options will vary, including "none"): Treatment of invasives and grapes to reduce their potential as seed sources and to prevent vines from overtaking canopy trees and creating self-perpetuating, self-enlarging gaps in areas that are already infested with invasives or grapes.

Historical/archaeological/contemporary: By definition, this plantation is itself a cultural artifact.

Management history: most recent logging carried out about 20 years ago (see above) by Peter Rayton, logger.

Desired future condition: A multi-aged, mixed-species forest of vigorous trees that is free of the influence of non-native invasive plants and other interfering factors.

Silvicultural ideas: Thin to promote the long term growth of well-formed white pine and Norway spruce while beginning to develop a hardwood understory in selected openings.

Discussion of silvicultural ideas: It is very likely that the silviculture would fail. In all likelihood, bittersweet, combined with grapes, would aggressively take advantage of this disturbance and overrun any new hardwoods in the understory. Further, bittersweet would be energized to climb tall trees and restrict growth as well as produce abundant

STAND DESCRIPTIONS

seeds. If bittersweet and grapes are controlled and the seedbank is sufficiently diminished, over the course of time, this idea can be revisited.

Recommended management for the next 10 years: Next steps (1) control (by cutting) grape vines, (2) control bittersweet vines throughout (concurrent with Stand 3), (3) once interfering vegetation has been controlled, use the silvicultural method known as a shelterwood to cultivate and release the understory and midstory hardwoods. This may be through active harvesting or through cut & leave.

STAND DESCRIPTIONS

Stand	Type	Acres	MSD	BA	Mbf per acre	Cords per acre	Site Index WP	Growth Rate (Mbf/yr)
3	RP	17.0	8.8	109	7.9	8	68	2.8

Special water quality concerns (for stands within a reservoir watershed): Same as Stand 1.

Silvicultural Status (options are "suitable" or "not suitable"): NOT suitable.

Overstory: Forest Type and Condition: This is a plantation of red pine. The red pines are well-formed and of medium height (ca. 80'). Spacing is good due to past thinning. The thinning occurred about 20 years ago. At that time, all salvageable Scots pine that had been co-planted with the red pine was removed, though some may have been dead at that time. This may have been primarily in the central part of the stand where there is little or no red pine but there is abundant, moss-covered coarse woody debris from one or more types of softwoods. Scots pine has not tended to fare well in this area and so it would not be a surprise if the Scots pine here had been weak or dying at that time. In some areas, there are tall, slender hardwoods that extend toward the lower canopy of the red pines. These include sugar maple, red maple, black birch and black cherry.

The red pine is similar in health and appearance to most of the red pine areas at the Roberts Meadow Watershed, which is to say that the trees are not vigorous. There was only a limited display of recent or immanent mortality, and evidence of attack by Ips beetles was only noted in standing dead trees.

Throughout the red pine stand, and even more so in the central area lacking a conifer overstory, there is a fairly thick mid-story and understory of stout hardwood saplings, many of which are sugar maple. Red maple, black birch, black cherry and elm also occur. In the western part of the stand, the well-formed sugar maples look vigorous and promising, but in the central and western parts, the understory is heavily infested with bittersweet and grapes.

Understory:

Desirable Tree Regeneration (species and distribution) for future overstory: The hardwoods described above are well established and should be able to form the basis for a new overstory that could, someday, replace the current red pine overstory.

Interfering native vegetation: Same as Stand 2.

Other native understory vegetation (species and distribution): Same as Stand 1.

STAND DESCRIPTIONS

Non-native invasive vegetation (species, distribution/severity) (see "Notes applying to all stands" above): Severity level is 3 overall, but varies between 1 and 5. Only the western third of the stand was free of invasives. Moving from west to east, the remaining area was increasingly infested with bittersweet and grapes, including small gaps that had filled in with bittersweet and grapes just as in Stand 2. The abundant oriental bittersweet seed source in adjacent Stand 2 adds to the risk. Japanese barberry was also present.

Soils (type, moisture, drainage and productivity): Soil is Walpole (See "Overview of Soils" above).

For tree growth purposes: This soil (in this particular location) is seasonally quite wet at or near the surface, and, apparently red pine has difficulty growing tall within the framework of a fluctuating water table and low moisture-holding capacity.

For logging purposes: This soil is well-suited to logging activity as long as water tables are low or the ground is frozen.

Habitat:

General Habitat: Somewhat tall, thin, partially-closed canopy of red pine with no special habitat value. There are a few or no snags and a number of large downed trees. The areas of water close to the surface and the thickets of vines are beneficial to wildlife.

Do wetlands occupy more than 10% of this stand? No.

Were vernal pools identified/mapped for this stand? (if "yes", how many): No.

Are NHESP layers indicated for this stand? (if "yes", describe) Yes. A small part of a larger NHESP polygon (presumed to be wood turtle) is indicated for this stand.

Other Special Habitat (elements to preserve) (e.g. tall ledge outcrops, etc.): None.

Special risks to habitat: The possibility of bittersweet and grapes spreading throughout the stand, pulling it down and preventing any new tree growth if canopy gaps are created by microbursts, other storms, silviculture, or by the actions of vines themselves.

Desired habitat modifications (options will vary, including "none"): Treatment of invasives and grapes to reduce their potential as seed sources and to prevent vines from overtaking canopy trees and creating self-perpetuating, self-enlarging gaps in areas that are already infested with invasives or grapes.

Historical/archaeological/contemporary: Ditching along the southern boundary reflects efforts in the past to improve this land for agricultural use.

STAND DESCRIPTIONS

Management history: most recent logging carried out about 20 years ago (see above) by Peter Rayton, logger.

Desired future condition: A multi-aged, mixed-species forest of vigorous trees that is free of the influence of non-native invasive plants and other interfering factors.

Silvicultural ideas: Harvest most of the red pine to capture the value, but do this in a way that protects the sugar maple/hardwood midstory, allowing these hardwoods to form the new overstory.

Discussion of silvicultural ideas: It is very likely that bittersweet, combined with grapes, would aggressively take advantage of this disturbance and overrun the new hardwood overstory, causing a complete failure of the silviculture. If bittersweet and grapes are controlled and the seedbank is sufficiently diminished, over the course of time, this idea can be revisited.

Recommended management for the next 10 years: Next steps (1) control (by cutting) grape vines, (2) control bittersweet vines throughout (concurrent with Stand 3), (3) once interfering vegetation has been controlled, use the silvicultural method known as a thinning to improve vigor in selected overstory trees. This may be through active harvesting or through cut & leave.

STAND DESCRIPTIONS

Stand	Type	Acres	MSD	BA	Mbf per acre	Cords per acre	Site Index WP	Growth Rate (Mbf/yr)
4	SS	17.2	N/A	N/A	N/A	N/A	N/A	0.0

Special water quality concerns (for stands within a reservoir watershed): Same as Stand 1. This is not a forested stand.

Silvicultural Status (options are "suitable" or "not suitable"): NOT suitable.

Overstory: Forest Type and Condition: this is a fascinating wetland complex that includes an active beaver pond within a framework of shrub swamp and shallow marsh and wet meadow complex. Roberts Meadow Brook flows through this stand. The stand boundary and property boundary is defined on the east side largely by the excavated edges of an old gravel bank, where here is a limited amount of residual pine-oak upland. The vegetation is highly variable, but includes common shrub swamp and wet meadow plants such as dogwood, winterberry, elm, viburnum, spirea, highbush blueberry, maleberry, speckled alder, poison ivy and red maple, as well as cattails, grasses, reeds and ferns. There are also wild grapes and non-native invasive plants (see below).

Understory:

Desirable Tree Regeneration (species and distribution) for future overstory: Not found.

Interfering native vegetation: Wild grapes do occur in areas that are not excessively wet and thus will probably never be widespread in this stand. Other interfering vegetation (hay-scented fern, witch hazel, beech, mountain laurel) was not noted to be a problem.

Other native understory vegetation (species and distribution): See description of overstory.

Non-native invasive vegetation (species, distribution/severity) (see "Notes applying to all stands" above): Severity level is 4. Oriental bittersweet, multiflora rose and Japanese barberry are flourishing where the ground is not excessively wet which, as with the wild grapes, generally means the perimeter areas and interfaces with abutting stands. When beaver-flooding recedes in the future (due to the cyclical nature of their activity), the invasives are likely to colonize some of the area that is currently flooded. In the northern section, which is a shallow marsh or wet meadow, phragmites is well established.

Soils (type, moisture, drainage and productivity): Soil is Old Gravel Pit (See "Overview of Soils" above).

STAND DESCRIPTIONS

For tree growth purposes: Most of this soil is too wet for most tree growth over an extended period of time.

For logging purposes: This soil is too wet for logging activity.

Habitat:

General Habitat: A variety of wetland features covering about 17 acres.

Do wetlands occupy more than 10% of this stand? Yes.

Were vernal pools identified/mapped for this stand? (if "yes", how many): No.

Are NHESP layers indicated for this stand? (if "yes", describe) Yes. All of this stand falls within a larger NHESP polygon (presumed to be wood turtle) is indicated for this stand.

Other Special Habitat (elements to preserve) (e.g. tall ledge outcrops, etc.): None.

Special risks to habitat: The possibility of bittersweet and grapes spreading throughout edge and interface areas of the stand, pulling down trees, and preventing new tree growth in these areas. Also, there is a risk of phragmites continuing to spread, which will reduce the abundance and diversity of native vegetation.

Desired habitat modifications (options will vary, including "none"): Treatment of invasives (bittersweet, multiflora rose and barberry) as well as phragmites and grapes to reduce their potential as seed sources and to prevent them from interfering with desirable habitat processes.

Historical/archaeological/contemporary: This is an old gravel pit.

Management history: most recent logging carried out in fringe areas of this stand about 20 years ago (see above) by Peter Rayton, logger. Access was through the northeast abutter.

Desired future condition: A dynamic mix of thriving native wetland communities that is free of the influence of non-native invasive plants and other interfering factors.

Silvicultural ideas: N/A.

Discussion of silvicultural ideas: N/A.

STAND DESCRIPTIONS

Recommended management for the next 10 years: Next steps (1) control (by cutting) grape vines, (2) control bittersweet, multiflora rose and barberry throughout, (3) control phragmites.

MANAGEMENT PRACTICES
to be done within next 10 years

Explanation of Silvicultural Methods

“Silviculture” is the body of ideas and practices used by foresters to shape the forest. Ideally, the forester will mark the silviculture (by painting trees to be cut). A crucial aspect of success is to find a logger who is willing and able to carry out the marked cutting as the forester intends.

To the landowner: recommended silvicultural methods for your particular forest stands are referred to in Stand-level management practices on subsequent pages and are drawn from the following list, which is based on (**proposed**) Chapter 132 (Forest Cutting Practices Act) regulations. Silvicultural methods are broadly divided into two groups, **intermediate cuts** and **regeneration cuts**. Intermediate cuts focus on improving growth in existing overstory trees. Regeneration cuts focus on establishing and promoting new stands of trees. Please note that in considering or implementing any of the methods described below there are numerous factors that must be contemplated and addressed, such as competing vegetation, browse, optimal logging systems, woodlot access (roads, landings, etc.), time of year and ground conditions, and measures to protect state-listed species, watercourses and wetlands, etc.

Intermediate Cuts

Thinnings & Improvement Cuts: These reduce the density of trees to enhance the vigor of residual trees. An improvement cut is usually an initial treatment that removes trees of low quality or undesirable species. Thinnings are subsequent adjustments to continue focusing growth on selected trees. Intermediate cuts that are overly “heavy” (i.e. cuts that let in a lot of light) are classified as regeneration cuts: *proposed* (pending as of this writing) basal area thresholds are as follows: BA = 100 for conifer stands, BA = 60 for hardwood stands, BA = 80 for conifer-hardwood stands.

Regeneration Cuts

Regeneration cuts use existing stands of trees to create future stands of trees. The future stands of trees can be of a single age (known as “even-aged”), two ages (two-aged) or of three or more ages (uneven-aged). In regeneration cuts, particular attention is paid to seed sources and/or existing seedlings/saplings for the future stand, light conditions in the understory, and interfering factors (e.g. native or non-native competitor plants in the understory, browsing by deer or moose, etc.). A regeneration cut can be sudden and decisive (clearcutting, seed-tree, coppice, single-cut shelterwood), or a regeneration cut can be staggered (multiple cut shelterwood), or ongoing (uneven-aged, i.e. “selection system” or “irregular shelterwood”).

MANAGEMENT PRACTICES
to be done within next 10 years

Even-aged Regeneration Methods

Clearcut: All established trees are removed to allow new trees to grow from seed in full sun. Clearcutting is especially appropriate for early-successional species (e.g. paper birch, poplar and black cherry plus gray birch and pin cherry) and may grow with mixes of hemlock, red maple and other birches. Seeding is assumed to occur from edge trees or from seed stored in the soil (cherry). Clearcuts may be up to 5 acres, or, if artificial seeding or planting is used, up to 10 acres. Larger clearcuts require special permission. Clearcuts separated by more than 100 feet are considered separate. Clearcutting is sometimes confused with the final cut ("overstory removal cut") in a shelterwood system (see below), but the difference is that clearcutting is done to grow new trees from seed, whereas the overstory removal cut in a shelterwood system is done to release existing seedlings or saplings. Clearcutting is also sometimes confused with patch selection (see below); in fact, the distinction between two practices falls into a gray area.

Seed-Tree Cut: Similar to a clearcut except that (1) seed trees are retained to provide seed (and either cut later or leave) and (2) any species may be grown (i.e. desired regeneration does not have to be from light-seeded species or cherry). There is no acreage limitation. At least 4 seed trees (20-inch diameter or greater (BA = 10)) or 12 seed trees (14-20 inches diameter) (BA 20) must be retained per acre.

Shelterwood/ Shelterwood System: usually a multi-step approach to establish desirable trees in the understory in medium-light conditions before the overstory is eventually removed to release the seedlings. The final step in the shelterwood system is the overstory removal, which is done to release the established young trees. Used especially for oak, sugar maple (giving these species years to establish well-developed root systems) white pine and hemlock (giving these species years to establish competitive height). Black birch typically becomes abundant as well. Regeneration that is adequate for release must typically be 2 feet tall, well-distributed and abundant. Interfering vegetation must be identified and (ideally) controlled.

Coppice: a complete "cutting off" of small or medium-sized hardwoods, especially oaks, hickory, red maple) to cause these to re-sprout and form a new stand from the same root systems. This is an old system that sometimes occurs inadvertently, and is useful for reliably producing firewood or whips (i.e. saplings used for any number of purposes).

Two-aged Regeneration Methods

Clearcut, Seed-tree, Shelterwood with "reserves": Same as methods described above but with retention of trees (12 inches diameter or larger) (possibly for timber, seed source, habitat or aesthetic reasons, but not for the purpose of managing understory light conditions).

Uneven-aged Regeneration Methods (Selection/Irregular Shelterwood)

MANAGEMENT PRACTICES
to be done within next 10 years

In an uneven-aged stand there will always be trees in a range of size and age classes that are *free to grow*. Often current conditions will be an approximation of this, but over time a true multi-aged stand can be created and maintained. A selection cut is a mix of thinning and creating or enlarging openings. Openings are defined either as groups or patches; new openings generally do not cover more than 50% of the stand area.

Group Selection: openings may range from single-tree-size up to 1/4 acre (e.g. equivalent to a circle about 120 feet in diameter in size, which is about 1.5 times the mature height of many trees (80'-100')). No special provisions are needed to prepare the understory for this more conservative opening size, though, to achieve the ideal outcome, it may be necessary to control competing vegetation (native vegetation such as beech or striped maple, or non-native invasive vegetation such as bittersweet, buckthorn, etc.).

Patch Selection: openings may range up to 2 acres (e.g. equivalent to a circle about 333 feet in diameter). Interfering vegetation (if present) should be identified and ideally controlled so that seedlings can be established/released. Please note: in Massachusetts, patch cuts will appear identical (to the public) as clearcutting.

Continuous-Cover Irregular Shelterwood: (see "The Irregular Shelterwood System", Journal of Forestry, December, 2009) is used to "create and maintain an unbalanced, multi-aged stand for a long and indefinite period of time by successive regeneration fellings." This system is perhaps the most complex, but is the most versatile for creating or maintaining complex forest conditions. In this system, elements of thinning, shelterwood, and group selection are combined and applied in ways that reflect the current conditions and ultimate potential of specific woodlot areas, and strongly reflect the judgement and vision of the forester. A forest managed in this way will not have an "industrial" feel and should be rewarding for people with a wide range of interests ranging from on-going timber production to contemplative enjoyment of nature. This system is not used when the landowner wants to maximize short-term income or dramatically alter the landscape (for this see "Even-Age Regeneration Methods" above).

MANAGEMENT PRACTICES
to be done within next 10 years

Treatment Recommendations for Non-Native Invasive Plants Based on Stand

Ranking: treatments of interfering vegetation will be designed according to the degree of infestation. For each stand and situation, a specific prescription would be developed. The general approach to treatments is discussed below.

In Stands ranked 1, there is typically no need to treat interfering vegetation.

In Stands ranked 2 and scheduled for silvicultural activity, control of interfering vegetation is typically recommended as a condition of the harvest (i.e. recommended to occur, as a separate step to be done by separate contractors before, during, or right after the harvesting.) Without treatment of interfering vegetation, these harvests should not be pursued (because it would merely spur new growth in the interfering vegetation). A typical treatment for stands ranked 2 would be as follows:

- Winter, Year 1 (dormant season): cut-stump herbicide application to invasive plants and interfering vegetation using Garlon 4 Ultra in basal oil. Various saws and clippers used as needed.
- Summer, Year 1: as needed, foliar herbicide application of triclopyr-based herbicide on low and resurgent vegetation (e.g. horizontal vines, resprouts, etc.). Use backpack sprayer.
- Summer, Year 2: as needed, follow-up foliar spray application.

For some Stands ranked 3 (none of these are slated for silvicultural treatment), especially where there is significant timber, treatments are recommended that would seek to reduce the Stand ranking to 2 so that harvesting could occur in the future (though probably beyond the 10-year time frame of this plan). A typical treatment for stands ranked 3 would be as follows:

- Winter, Year 1 (dormant season): cut-stump herbicide application to invasive plants and interfering vegetation. Various saws and clippers used as needed.
- Summer, Year 1: as needed, foliar herbicide application of triclopyr-based herbicide on low vegetation (e.g. horizontal vines). Mistblower and/or backpack sprayer would be used.
- Late Summer, Year 1: as needed, foliar herbicide application of glyphosate-based herbicide and imazapyr-based herbicide on low vegetation (e.g. horizontal vines) on low-growing vegetation.
- Summer, Year 2: as needed, follow-up foliar spray application.
- Summer, Year 3 as needed, follow-up foliar spray application.

For some Stands ranked 4 or 5, no active treatment is recommended at this time, unless the DPW wishes to be very ambitious and regain the ability to manage all DPW lands with normal silvicultural methods. The exceptions would be for included areas ranked 4 (i.e. parts of Stands 3 and 4). Control is recommended in these focused areas in order to prevent these areas from enlarging over time and from serving as a seed source to surrounding areas. A typical treatment for stands ranked 4 or 5 would be as follows:

- Winter, Year 1 (dormant season): cut-stump herbicide application to invasive plants and interfering vegetation. Various saws and clippers used as needed.
- Winter, Year 1 (6 weeks after previous treatment): if needed, using equipment as needed, create walkable access routes into the treatment area
- Summer, Year 1: foliar herbicide application of triclopyr-based herbicide on low vegetation (e.g. horizontal vines). Mistblower and/or backpack sprayer would be used.
- Late Summer, Year 1: foliar herbicide application of glyphosate-based herbicide and imazapyr-based herbicide on low vegetation (e.g. horizontal vines) on low-growing vegetation.
- Fall, Year 1 or early spring, Year 2: in Stands ranked 5, possible planting of new vegetation (e.g. Norway spruce to cast dense shade) to grow in combination with native vegetation.
- Summer, Year 2: as needed, follow-up foliar spray application.
- Summer, Year 3 as needed, follow-up foliar spray application.

MANAGEMENT PRACTICES
to be done within next 10 years

Recommended Management 2013-2023:

Trails/Roads/Drainage

There are no well-established trails on this property. There are no actively used roads. Therefore, there are no trail, road or drainage issues that need to be addressed.

Boundaries & Encroachment

Locate, blaze and paint all boundaries.

Contact northern abutter to review ca. ½-acre encroachment situation (fenced-in pasture area that may have been established with permission at an earlier time).

Control of Interfering Vegetation

Control of grape vines: All stands (mechanical treatment) (all stands):

Control of grapes: This is a one-time treatment involving cutting grapes (grape vines) close to the ground and, typically, also at chest or shoulder height. There will be some re-sprouting, but deer browse and shade will probably be sufficient to prevent the sprouts from surviving. The work will probably be done by chainsaw, but because this is a wetland area, it would be good to use canola oil in place of traditional mineral-based bar oil. Canola oil works fine, and using it avoids the problem of spraying mineral-based bar oil all over the wetland. Spot areas in Stand 1 with large grape vines will remain uncut in the prescribed harvest (see below).

Control of oriental bittersweet and incidental control of Japanese barberry and multiflora rose (Stands 2 & 3 and, if needed, on a spot basis in Stands 1 & 4):

First, maintain maximum shade by not cutting. Second, follow the initial practice indicated below. Third, if feasible and if needed, follow the complete regimen listed above for stands ranked 3. Continue to monitor the response of bittersweet and other non-native vegetation.

•**Winter, Year 1 (dormant season):** cut-stump herbicide application to invasive plants and interfering vegetation using Garlon 4 Ultra in basal oil. Various saws and clippers used as needed.

Note on abutters: As discussed in the Stand Descriptions for Stand 1, the success of bittersweet control would be greatly enhanced by involving at least two abutters (to the north and northwest) who would be willing to control bittersweet on their own land (or allow DPW to do this).

MANAGEMENT PRACTICES
to be done within next 10 years

Overview of harvesting

Stand	Type	Silviculture (harvesting)	Acres to Cut	BA to Cut	Mbf to Cut	Cords to Cut	Timing
1	WH	selection	5.0	34	10	19	2013 /15
2	SP/WP	None	0.0	0.0	0.0	0.0	N/A
3	RP	None	0.0	0.0	0.0	0.0	N/A
4	SS	N/A	0.0	0.0	0.0	0.0	N/A
			5.0		10	19	

Stand	Type	Silviculture (harvesting)	Acres to Cut	BA to Cut	Mbf to Cut	Cords to Cut	Timing
1	WH	selection	5.0	34	10	19	2013 /15

Practice purpose (how it helps create desired future condition)

This practice will help maintain vigor in desired trees.

Trees to be removed & retained (types, conditions, sizes): Most trees to remove would be lower-quality or lower-vigor white pine timber and pulpwood as well as hardwoods of pallet or firewood quality. Trees to retain would be well-formed and/or vigorous trees of any species and any size, primarily white pine and red oak.

Special regeneration considerations (seed source, seed bed preparation, interfering vegetation, browse, etc.): N/A.

Special invasive species considerations: Please re-confirm severity ranking for this stand (cf. Stand Descriptions section). Stand must be ranked 1 or 2. If ranked 1, no treatment required. If ranked 2, treatment must fall within the same 12-month period as any harvesting. Stands ranked 3 or 4 are not eligible for harvesting.

Current level = 2.

Special soil considerations (erosion, seasonal timing, cultural, etc.): Ground must be adequately dry or frozen so that rutting/compaction are avoided.

Special access considerations (erosion, access, timing, cultural, etc.): Access is off North Road. There are no special challenges connected with this access, but the landing will have to be blocked off at the end of the job to prevent unwanted uses. One or more loads of gravel may be required to stabilize the landing entrance.

MANAGEMENT PRACTICES
to be done within next 10 years

Special equipment/logging-system considerations: Any system that can adequately protect the ground/soil and residual stand is acceptable.

Special boundary considerations: Boundaries should be blazed/re-blazed and painted.

Special habitat improvements (anything particular to accomplish): None.

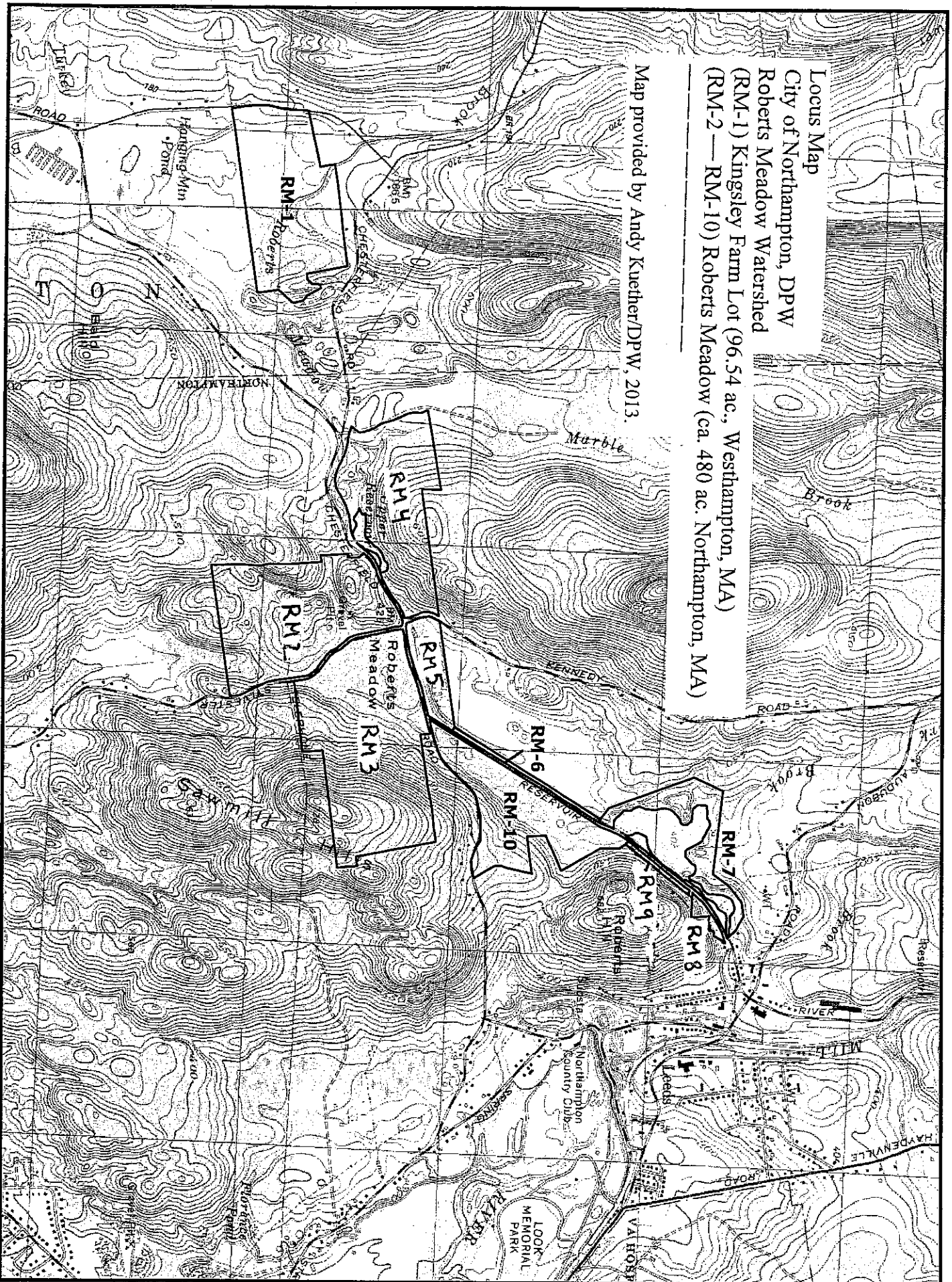
Special habitat protection considerations (anything particular to protect): None needed for the eastern part of the stand.

Special trail/recreational considerations (anything particular to accomplish or avoid/protect): None.

Special cultural resource considerations: None.

Locus Map
 City of Northampton, DPW
 Roberts Meadow Watershed
 (RM-1) Kingsley Farm Lot (96.54 ac., Westhampton, MA)
 (RM-2—RM-10) Roberts Meadow (ca. 480 ac. Northampton, MA)

Map provided by Andy Kueher/DPW, 2013.

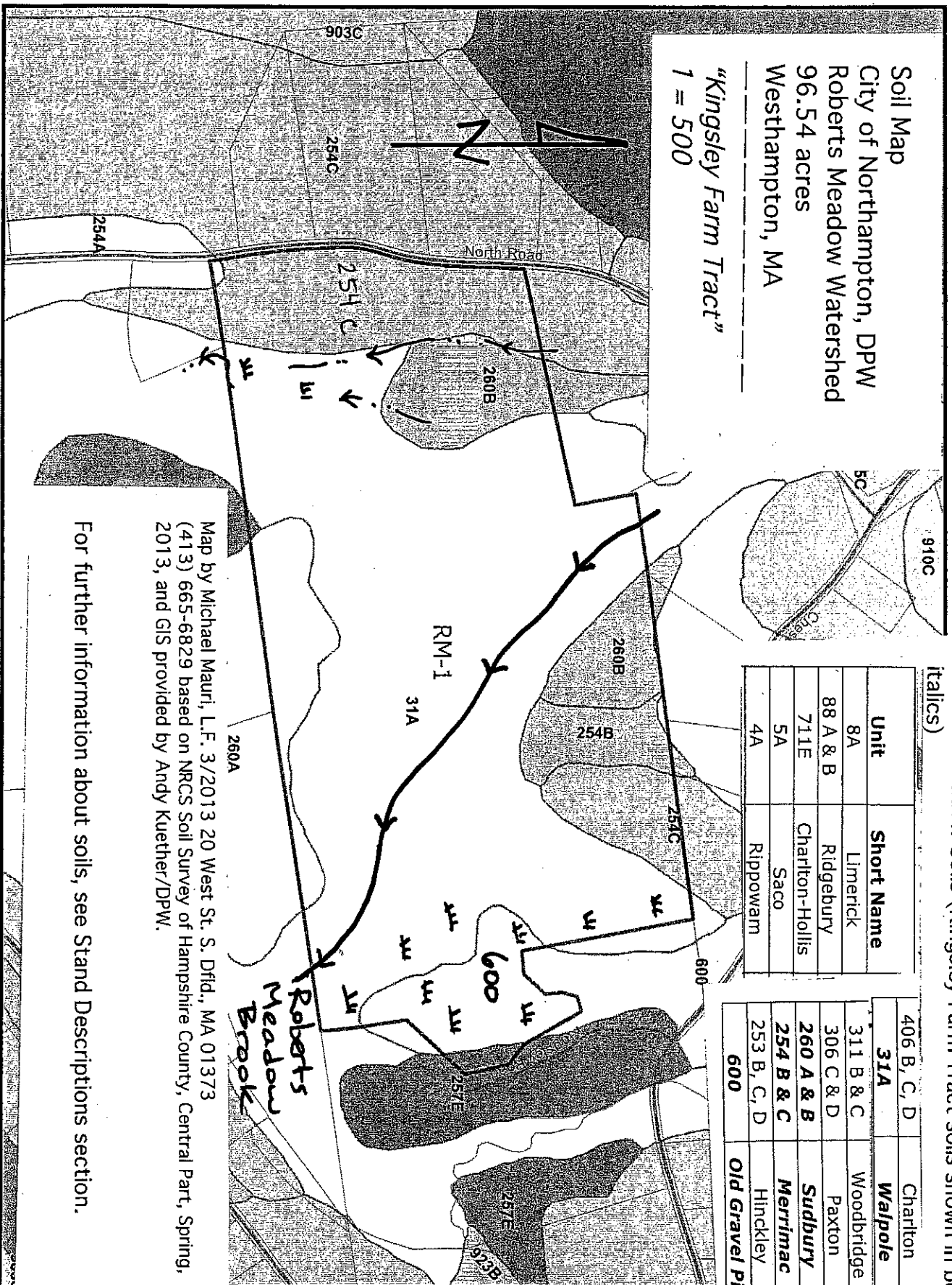


Roberts Meadow Soils (Kingsley Farm Tract soils shown in bold italics)

Unit	Short Name	406 B, C, D	Charlton
8A	Limerick	<i>31A</i>	<i>Walpole</i>
88 A & B	Ridgebury	311 B & C	Woodbridge
711E	Charlton-Hollis	306 C & D	Paxton
5A	Saco	<i>260 A & B</i>	<i>Sudbury</i>
4A	Rippowam	<i>254 B & C</i>	<i>Merrimac</i>
		253 B, C, D	Hinckley
		<i>600</i>	<i>Old Gravel Pit</i>

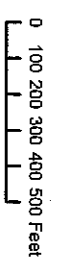
Soil Map
City of Northampton, DPW
Roberts Meadow Watershed
96.54 acres
Westhampton, MA

"Kingsley Farm Tract"
1 = 500



Map by Michael Mauri, L.F. 3/2013 20 West St. S. Dfid., MA 01373
(413) 665-6829 based on NRCS Soil Survey of Hampshire County, Central Part, Spring, 2013, and GIS provided by Andy Kuether/DPW.

For further information about soils, see Stand Descriptions section.



Signature Page Please check each box that applies.

☐ **CH. 61/61A Management Plan** I attest that I am familiar with and will be bound by all applicable Federal, State, and Local environmental laws and /or rules and regulations of the Department of Conservation and Recreation. I further understand that in the event that I convey all or any portion of this land during the period of classification, I am under obligation to notify the grantee(s) of all obligations of this plan which become his/hers to perform and will notify the Department of Conservation and Recreation of said change of ownership.

☒ **Forest Stewardship Plan.** When undertaking management activities, I pledge to abide by the management provisions of this Stewardship Management Plan during the ten year period following approval. I understand that in the event that I convey all or a portion of the land described in this plan during the period of the plan, I will notify the Department of Conservation and Recreation of this change in ownership.

☒ **Green Certification.** I pledge to abide by the FSC Northeast Regional Standards and MA private lands group certification for a period of five years. To be eligible for Green Certification you must also check the box below.

☒ **Tax considerations.** I attest that I am the registered owner of this property and have paid any and all applicable taxes, including outstanding balances, on this property.

Signed under the pains of perjury:

Owner(s) *David S. Kneaf* Date 4/30/13

Owner(s) _____ Date _____

I attest that I have prepared this plan in good faith to reflect the landowner's interest.

Plan Preparer *[Signature]* Date 4-29-13

I attest that the plan satisfactorily meets the requirements of CH61/61A and/or the Forest Stewardship Program.

Approved, Service Forester *Sam Abbey* Date 5/29/13

Approved, Regional Supervisor _____ Date _____

In the event of a change of ownership of all or part of the property, the new owner must file an amended Ch. 61/61A plan within 90 days from the transfer of title to insure continuation of Ch. 61/61A classification.

Owner(s) City of Northampton Town(s) Westhampton

Page — of

